IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

In re the Application of

Inventors	:	**Donald Christopher et al.**
Application No.	:	**10/694,666**
Filed	:	**October 27, 2003**
For	:	**AUTOMATIC OPTIMIZATION OF DOPPLER DISPLAY PARAMETERS**

APPEAL BRIEF

On Appeal from Group Art Unit 3737

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I. REAL PARTY IN INTEREST

The real party in interest is Koninklijke Philips Electronics N.V., Eindhoven, The Netherlands, assignee of the present application by an assignment of the priority application by all of the inventors dated October 19, 2001 and recorded at the USPTO, confirmation number 9193.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 9-17, 19 and 23 are pending in the application, all of which have been finally rejected. Claims 1-8, 18, 20-22 and 24-33 were previously canceled. The claims being appealed are Claims 9-17, 19 and 23.

IV. STATUS OF AMENDMENTS

No amendments were submitted in response to the Final Rejection mailed June 6, 2006. A Response to Final Office Action and Submission of Declaration was accepted by the Examiner and considered in an Advisory Action mailed December 1, 2006.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The subject matter of the claimed invention is a method for optimizing the display of Doppler ultrasound information. Doppler signal information is received, including at

least some Doppler signal information which is not used to produce a displayed image. Some Doppler signal information is processed for display of an image in a display area. Doppler signal information which is not used for an image is analyzed to optimize specific display parameters of the displayed image, which are the PRF (velocity range), the color baseline, the color range polarity, or the range of color pixel values. Thus, Doppler signals not used for display can be specifically tailored for use only in the optimization of the displayed Doppler signals, enabling a more consistently and more robustly optimized Doppler image.

An example of the problem solved by the present invention is shown in Fig. 5 of the application. There it is seen that the spectral Doppler trace has aliased and wrapped around so that the excursions which should be at the top of the trace appear intermittently at the bottom of the display. The paragraph beginning on page 4 of the specification explains how a display problem such as this one can be cured by automatically adjusting parameters of the display such as the PRF, Doppler baseline position, or the baseline inversion (polarity). As explained on page 2, lines 25-35 and in the paragraph beginning on page 7, line 17, this display optimization can be performed using the displayed Doppler data, or with what is known as "hidden Doppler" which is Doppler data acquired and not used for display, the latter being the subject of Claim 9. This example illustrates the use of spectral Doppler data to cure problems in a spectral Doppler display. These same principles are extended to cure problems in colorflow displays as explained on pages 10-11 of the specification. The paragraph beginning on page 10, line 28 explains how colorflow Doppler data is used to optimize a colorflow display with parameters such

as the color pixel values, the PRF, the color range and the color baseline. An ultrasound system performing this optimization is shown in Fig. 10, in which colorflow data from a processor 18 is coupled to a velocity display optimizer 20, which couples optimized display parameters back to the colorflow Doppler processor 18. The paragraph beginning on page 11, line 11 explains how spectral Doppler data is used to optimize the parameters of a colorflow display. This is illustrated in Fig. 11 in which spectral data from a spectral Doppler processor 16 is coupled to a velocity display optimizer 20, which in turn couples optimized display parameters to the colorflow Doppler processor 18.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether Claims 9-15, 17, 19 and 23 stand correctly rejected under 35 U.S.C.§102(b) as being anticipated by Torp et al. (U.S. Pat. 6,099,471).

2. Whether Claim 16 stands correctly rejected under 35 U.S.C.§103(a) as being unpatentable over Torp et al. in view of Seo (U.S. Pat. 4,501,279).

VII. ARGUMENT

A. Rejection of Claims 9-15, 17, 19 and 23 as anticipated by Torp et al.

Claims 9-15, 17, 19 and 23 stand correctly rejected under 35 U.S.C.§102(b) as being anticipated by Torp et al. (U.S. Pat. 6,099,471). The portions of the Torp et al. patent which are said to show anticipation of Claim 9 are column 3, line 61 to column 4, line 27, column 4, line 55 to column 5, line 10, and column 7, line 54 to column 8, line 48. However a review of these passages shows no reference whatsoever to optimizing Doppler image displays, and certainly no reference to the use of "hidden" Doppler for

anything, let alone Doppler display optimization. The passages only describe how strain velocity information may be calculated and displayed in real time, the intent of Torp et al. This fact was pointed out in the Declaration of Ivan Salgo, MD, an expert in diagnostic ultrasound. This evidence stands unrebutted, as indeed the Examiner stated that the points in the Declaration are legitimate. Accordingly it is respectfully submitted that Claim 9 and its dependent Claims 10-15, 17, 19 and 23 are not anticipated by Torp et al.

In the Advisory Action the Examiner seems to be taking the position that any Doppler signal which is not immediately displayed but is processed to produce something which is displayed would describe the claim phrase "Doppler signal information which is not used to produce a displayed Doppler image." However as has been well known in the ultrasound art for over twenty years, a received Doppler signal *per se* is never displayed, it is always processed to produce the signal which is displayed. The received echo used for Doppler imaging is an ordinary sine wave, just as all ultrasound echoes are. The processing of the echo signals identifies the Doppler shift experienced by the signals due to moving blood or tissue, the processing of which is well known in the art. The velocity is proportional to the phase shift, and it is this information which is displayed either through color mapping or spectrally or by calculating strain, which is a velocity differential. Consequently one skilled in the ultrasound art would never expect a raw echo signal to be displayed in a Doppler display because, until it is processed, the Doppler shift is unrevealed. Furthermore, the claim phrase distinguishes from Doppler signal information which is used to produce a displayed Doppler image, the conventional approach to imaging and optimization. It is respectfully submitted that the phrase

"Doppler signal information which is not used to produce a displayed Doppler image" clearly and accurately distinguishes the claimed invention over the prior art to anyone skilled in the art.

B. Rejection of Claim 16 as obvious based upon Torp et al. in view of Seo

Claim 16 was rejected under 35 U.S.C.§103(a) as being unpatentable over Torp et al. in view of Seo. Seo is directed to producing a measure of average blood flow together with the ultrasonic tomogram. Seo was cited for its showing of cardiac gating, which is well known in the art. The average blood flow measurements of Seo are updated each time data from a new period of time is used for the calculation. Claim 16 recites that the optimizing parameters for display may be updated periodically after a few heart cycles. However Seo fails to mention or even hint at display optimization, let alone the use of undisplayed Doppler information for display optimization. Consequently Claim 9, from which Claim 16 depends, remains patentable over the combination of Torp et al. and Seo. It is respectfully submitted that Claim 16 is patentable over these patents for the same reason..

VIII. CONCLUSION

Based on the law and the facts, it is respectfully submitted that none of the appealed claims are anticipated by Torp et al. and that Claim 16 is patentable over the combination of Torp et al. and Seo. Accordingly, it is respectfully requested that this Honorable Board reverse the grounds of rejection stated in the Final Rejection.

Respectfully submitted,
DONALD CHRISTOPHER ET AL.

By: /W. Brinton Yorks, Jr./
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Reg. No. 28,923

APPENDIX A: THE CLAIMS ON APPEAL

1. - 8. (Canceled)

9. (Previously presented) A method for optimizing the display of Doppler ultrasound information comprising:

receiving Doppler signal information, including at least some Doppler signal information which is not used to produce a displayed Doppler image;

processing Doppler signal information for display of a Doppler image in a display area; and

analyzing Doppler signal information which is not used to produce a displayed Doppler image to optimize at least one of the display parameters of the PRF, the color baseline, the color range polarity, or the range of color pixel values for display of the processed Doppler signal information in the display area.

10. (Previously presented) The method of Claim 9, wherein processing further comprises processing Doppler signal information for display of a colorflow Doppler image in the display area.

11. (Previously presented) The method of Claim 9, wherein processing further comprises processing Doppler signal information for display of a velocity Doppler image in the display area.

12. (Previously presented) The method of Claim 9, wherein processing further comprises processing Doppler signal information for display of a Doppler M-mode image in the display area.

13. (Previously presented) The method of Claim 9, wherein processing further comprises processing Doppler signal information for display of a power Doppler image in the display area.

14. (Original) The method of Claim 9, wherein the optimized display parameters map the processed Doppler signal information to make more extensive use of the range of color or intensity of displayed Doppler information.

15. (Previously presented) The method of Claim 9,wherein analyzing Doppler signal information to produce optimized display parameters occurs substantially continuously during display of the Doppler image being optimized.

16. (Original) The method of Claim 9, further comprising updating the display parameters periodically after a predetermined number of heart cycles.

17. (Original) The method of Claim 9,wherein analyzing Doppler signal information to produce optimized display parameters occurs in response to modification of a Doppler setting by the user.

18. (Canceled)

19. (Previously presented) The method of Claim 9,further comprising:
storing a sequence of processed Doppler images in memory; and
wherein analyzing further comprises analyzing Doppler signal information to produce optimized display parameters for display of the stored Doppler images.

20. - 22. (Canceled)

23. (Previously presented) The method of Claim 9, wherein processing further comprises processing Doppler signal information for display of a spectral Doppler image in the display area.

24. - 33. (Canceled)

APPENDIX B: EVIDENCE OF RECORD

The following Declaration of Ivan Salgo was submitted on August 25, 2006 with applicants' RESPONSE TO FINAL OFFICE ACTION AND SUBMISSION OF DECLARATION, and accepted by the Examiner in the Advisory Action of December 1, 2006.

ATL-346

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Donald Christopher et al.
Art Unit: 3737
Serial No.: 10/694,666
Examiner: William C. Jung
Filed : October 27, 2003

For : AUTOMATIC OPTIMIZATION OF DOPPLER DISPLAY PARAMETERS

DECLARATION OF IVAN SALGO

I IVAN SALGO, MD am a research scientist with Philips Medical Systems. I have been working with clinical diagnostic ultrasound for the past 12 years. I have a master's degree in chemical engineering from Columbia University and a medical degree from Mt. Sinai School of Medicine, am board certified in anesthesiology, a testamur in echocardiography from the National Board of Echocardiography, and was on faculty as an assistant professor at the University of Pennsylvania Medical School and director of intraoperative echocardiography at the Hospital of the University of Pennsylvania.

I have reviewed US patent 6,099,471 (Torp et al.) This patent concerns an ultrasonic measurement called "strain velocity", which is derived from Doppler. Torp et al. produce strain velocity by obtaining tissue Doppler signals, then taking a derivative (gradient) of tissue

Doppler velocity to produce his strain velocity images from Doppler measurements as shown in Fig. 1 of their patent.

In Torp et al. all of the Doppler echoes are apparently used for the tissue Doppler signals used for strain imaging. There is no intimation of acquiring Doppler echo signals that are not used for imaging, and certainly no intimation of using any undisplayed Doppler signals to optimize the parameters of PRF, color baseline, color range polarity or the range of color pixel values of a Doppler image.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Ivan Salgo MD

Date: 23 Aug 2006

APPENDIX C: RELATED PROCEEDINGS

There are no related proceedings.